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448. Proposed by S. W. REAVES, University of Oklahoma.

Through a given point P within a given angle to draw a line which shall form with the sides of the angle a triangle of a given area [Well's *New Plane Geometry*, (1909), p. 153].

CALCULUS.

Solutions of 352, 354, 355, 356, 357, 358, 359, 361, 362, and 366 have been received. Solutions of 332, 337, 339, 340, 342 are desired.

368. Proposed by PAUL CAPRON, Annapolis, Md.

Develop $\log_{10} (x/\sin x)$ and $\log_{10} (\tan x)/x$, each to three terms, as functions of $\log_{10} \sec x$ and show that if x is less than $7^\circ 15'$ then, to five decimals,

$$\log_{10} x = \log_{10} \sin x + 1/3 \log_{10} \sec x = \log_{10} \tan x - 2/3 \log_{10} \sec x.$$

369. Proposed by I. A. BARNETT, Chicago, Ill.

Compute the definite integral $\int_a^b \log x dx$ by direct summation.

MECHANICS.

Solutions of 288, 289, 292, 293, and 294 have been received. Solutions of 268, 269, 274, 275, 277, 278, 279, 286, and 287 are desired.

296. Proposed by C. N. SCHMALL, New York City.

A force F is exerted in moving a horizontal cylinder up an inclined plane by means of a crowbar of length l . If R be the radius of the cylinder, W its weight, ϕ the inclination of the plane to the horizon and ψ the inclination of the crowbar to the horizon, show that

$$F = \frac{WR \sin \phi}{l[1 + \cos(\phi + \psi)]}.$$

297. Proposed by C. N. SCHMALL, New York City.

A shrapnel shell strikes the ground and then explodes, dispersing its fragments in all directions with a common velocity v . If A be the area of the ground covered by the fragments, and if the dimensions of the shell be neglected, show that $A = \pi v^4/g^2$.

NUMBER THEORY.

Solutions of 207, 210, 212, 216, and 218 have been received. Solutions of 189, 191, 192, 196, 200, 205, 208, 209, 211, 213, 214, and 215 are desired.

220. Proposed by E. T. BELL, Seattle, Washington.

Let $[m/n]$ denote the greatest integer that is not greater than m/n ; and let the two sets,

$$\left[\frac{m}{m-1} \right]; \left[\frac{m+1}{m-2} \right]; \left[\frac{m+2}{m-3} \right]; \dots; \left[\frac{2m-3}{2} \right],$$

$$\left[\frac{m-1}{m-1} \right]; \left[\frac{m}{m-2} \right]; \left[\frac{m+1}{m-3} \right]; \dots; \left[\frac{2m-4}{2} \right],$$

be denoted by (A) and (B) respectively.

Prove that a necessary and sufficient condition that $2m-1$ be a prime number is that the excess of the number of even integers in (A) over the number of even integers in (B) shall be equal to the excess of the number of odd integers in (A) over the number of odd integers in (B).

221. Proposed by THOS. E. MASON, Bloomington, Indiana.

Find numbers x such that the sum of the divisors of x is a perfect square [Carmichael, *Theory of Numbers*, p. 17].